PERIODIC TRENDS WORKSHEETS

Name : **Date :**

ATOMIC RADIUS

1. What trend in atomic radius do you see as you go down a group/family on the periodic table?

2. What causes this trend?

3. What trend in atomic radius do you see as you go across a period/row on the periodic table?

4. What causes this trend?

5. Circle the atom in each pair that has the largest atomic radius.
   a) Al B b) S O c) Br Cl d) Na Al e) O F f) Mg Ca

6. Put the following elements in order from smallest to largest atomic radius and explain why: C, O, Sn, Sr.

IONIZATION ENERGY

7. Define ionization energy

8. What trend in ionization do you see as you go down a group/family on the periodic table?

9. What causes this trend?

10. What trend in ionization do you see as you go across a period/row on the periodic table?

11. What causes this trend?

ELECTRONEGATIVITY

12. Define electronegativity

13. How does the ionic radius of a nonmetal compare with its atomic radius?

14. What trend in electronegativity do you see as you go down a group/family on the periodic table?

15. What causes this trend?

16. What trend in electronegativity do you see as you go across a period/row on the periodic table?

17. What causes this trend?

18. Circle the atom in each pair that has the greater electronegativity.

a) Ca Ga b) Li O c) Cl S d) Br As e) Ba Sr

Instructions Below the diagram, create a key that connects arrows with the following periodic trends: electronegativity, ionization energy, and atomic radius. Specify "increasing" or decreasing" for each trend. More than one trend can be associated with each arrow.

1 H Hydrogen 1.008																	2 He Helium 4.003
3 Li Lithium 6.94	4 Be Beryllium 9.012											5 B Boron 10.81	6 C Carbon 12.011	7 N Nitrogen 14.007	8 O Oxygen 15.999	9 F Fluorine 18.998	10 Ne Neon 20.180
11 Na Sodium 22.990	12 Mg Magnesium 24.305											13 Al Aluminum 26.982	14 Si Silicon 28.085	15 P Phosphorus 30.974	16 S Sulfur 32.06	17 Cl Chlorine 35.45	18 Ar Argon 39.948
19 K Potassium 39.098	20 Ca Calcium 40.078		21 Sc Scandium 44.956	22 Ti Titanium 47.867	23 V Vanadium 50.942	24 Cr Chromium 51.996	25 Mn Manganese 54.938	26 Fe Iron 55.845	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn Zinc 65.38	31 Ga Gallium 69.723	32 Ge Germanium 72.630	33 As Arsenic 74.922	34 Se Selenium 78.97	35 Br Bromine 79.904	36 Kr Krypton 83.798
37 Rb Rubidium 85.468	38 Sr Strontium 87.62		39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.95	43 Tc Technetium [97]	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.906	46 Pd Palladium 106.42	47 Ag Silver 107.868	48 Cd Cadmium 112.414	49 ln Indium 114.818	50 Sn Tin 118.710	51 Sb Antimony 121.760	53 Te Tellurium 127.60	53 I Iodine 126.904	54 Xe Xenon 131.293
55 Cs Cesium 132.905	56 Ba Barium 137.327	* 57 - 70	71 Lu Lutetium 174.967	72 Hf Hafnium 178.49	73 Ta Tantalum 180.948	74 W Tungsten 183.84	75 Re Rhenium 186.207	76 Os Osmium 190.23	78 lr Iridium 192.217	79 Pt Platinum 195.084	80 Au Gold 196.997	81 Hg Mercury 200.592	81 TI Thallium 204.38	82 Pb Lead 207.2	83 Bi Bismuth 208.980	84 Po Polonium [209]	85 At Astatine [210]	86 Rn Radon [222]
87 Fr Francium [223]	88 Ra Radium [226]	** 89 - 102	103 Lr Lawrencium [262]	104 Rf Rutherfordium [267]	105 Db Dubnium [270]	106 Sg Seaborgium [269]	107 Bh Bohrium [270]	108 Hs Hassium [270]	109 Mt Meitnerium [278]	110 Ds Darmstadtium [281]	111 Rg Roentgenium [281]	112 Cn Copernicium [285]	113 Nh Nihonium [286]	114 Fl Flerovium [289]	115 Mc Moscovium [289]	116 Lv Livermorium [293]	117 Ts Tennessine [293]	118 Og Oganesson [294]

*Lanthanide series	57 La Lanthanum 138.905	58 Ce Cerium 140.116	59 Pr Praseodymium 140.908	60 Nd Neodymium 144.242	61 Pm Promethium [145]	62 Sm Samarium 150.36	63 Eu Europium 151.964	64 Gd Gadolinium 157.25	65 Tb Terbium 158.925	66 Dy Dysprosium 162.500	67 Ho Holmium 164.930	68 Er Erbium 167.259	69 Tm Thulium 168.934	70 Yb Ytterbium 173.045
**Actinide series	89 Ac Actinium [227]	90 Th Thorium 232.038	91 Pa Protactinium 231.036	92 U Uranium 238.029	93 Np Neptunium [237]	94 Pu Plutonium [244]	95 Am Americium [243]	96 Cm Curium [247]	97 Bk Berkelium [247]	98 Cf Californium [251]	99 Es Einsteinium [252]	100 Fm Fermium [257]	101 Md Mendelevium [258]	102 No Nobelium [259]

KEY ANSWER

PERIODIC TRENDS WORKSHEETS

ATOMIC RADIUS

1. What trend in atomic radius do you see as you go down a group/family on the periodic table?

   Atomic Radius increases as you go DOWN a groupfamily.

2. What causes this trend?

   Each period you go down increases the energy levels surrounding the atom (you can draw Bohr Models to show this is true). For example, H and Li (in group 1A) both have 1 valence e, but H's is in the first energy level, and Li's is in the 2nd. This trend continues down each familylgroup.

3. What trend in atomic radius do you see as you go across a period/row on the periodic table?

   Across (L>R) a period, atomic radius decreases.

4. What causes this trend?

   As you go across a period (L>R) all of the elements have their valence e in the same energy level (you can drawa Bohr Model to show this is true). As you add more p*, you are increasing the positive force in the nucleus that attracts the e, and so the e are pulled in closer to the nucleus.

5. Circle the atom in each pair that has the largest atomic radius.

   a) (Al) B b) (S) O c) (Br) Cl d) (Na) Al e) (O) F f) Mg (Ca)

6. Put the following elements in order from smallest to largest atomic radius and explain why: C, O, Sn, Sr.

   O<C<Sn<Sr O will have a smaller radius than C because it is in the same period, but has more p*, and so holds its e in more closely. C is smaller than Sr because it is in the same group, but has less energy levels filled with e, so it can hold them in closer to the nucleus. Sr is smaller than Sr because it is in the same period, but has more p, so can hold its e in moreclosely.

IONIZATION ENERGY

7. Define ionization energy

   The amount of energy needed for an atom to lose an e

8. What trend in ionization do you see as you go down a group/family on the periodic table?

   As you go down a group, I.E. DECREASES.

9. What causes this trend?

   Think about the reason the radius gets bigger: adding more energy levels/electron shells. If my valence e is held further away from the attractive forces in the nucleus (the p), then they don't feel as strong a pull from the nucleus, and are easier to remove.

10. What trend in ionization do you see as you go across a period/row on the periodic table?

    As you go across (L→R) a period, I.E. INCREASES.

11. What causes this trend?

    Again, think about why atomic radius gets smaller across a period: more protons have a larger attractive force acting on a certain number of energy levels. With a larger attractive force, it is more difficult to pull the tightly held e away from the nucleus.

ELECTRONEGATIVITY

12. Define electronegativity

The tendency for an atom to attract an e in a chemical bond.

13. How does the ionic radius of a nonmetal compare with its atomic radius?

As you go down a group, electronegativity DECREASES

14. What trend in electronegativity do you see as you go down a group/family on the periodic table?

Think about atomic radius: we know the radius gets bigger as you go down a group, so the valence shell gets further from the attractive force (p) in the nucleus, so the valence shell feels a weaker attractive force, and e aren't as easily pulled in.

15. What causes this trend?

Think about atomic radius: we know the radius gets bigger as you go down a group, so the valence shell gets further from the attractive force (p) in the nucleus, so the valence shell feels a weaker attractive force, and e aren't as easily pulled in.

16. What trend in electronegativity do you see as you go across a period/row on the periodic table?

As you go across (L>R) a period, electronegativity INCREASES.

17. What causes this trend?

Think about atomic radius: more p* create a stronger attractive force, causing the e to be held more closely to the nucleus. Since the valence shell is closer to that (stronger) attractive force, it is easier to pull in e from other atoms.

18. Circle the atom in each pair that has the greater electronegativity.

a) Ca (Ga) b) Li (O) c) (Cl) S d) (Br) As e) Ba (Sr)

Instructions Below the diagram, create a key that connects arrows with the following periodic trends: electronegativity, ionization energy, and atomic radius. Specify "increasing" or decreasing" for each trend. More than one trend can be associated with each arrow.